the lateral ventral plates; the two or three posterior segments of the body enlarged and tuberose; anal styles small, not used in walking.

1. *Gonibregmatus Cumingii*, Newport.

Greyish ash-colour; frontal segment very convex, rounded posteriorly; mandibles blackish; labium smooth; all the segments of the body very short, convex; dorsal surface with numerous irregular longitudinal sulci; antepenultimate segment with the dorsal and ventral plates atrophied; anal styles slender, with their basilar internal margin carinated; anal scale convex, subcordate, posteriorly rounded with two thin marginal plates; legs 161 pairs, naked, claws black. Length $4\frac{3}{4}$ to 5 inches.

From the Philippine Islands. Mr. Cuming.

In the collection at the British Museum.

I have never seen the *Geophilus Walckenæri* of Gervais, but from the description given of that species I strongly suspect that it ought to be included in this genus.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

May 4, 1842.—Read "A Postscript to the Memoir on the occurrence of the Bristol Bone-Bed in the neighbourhood of Tewkesbury," by Hugh Edwin Strickland, Esq., F.G.S.

Since the reading of the former communication (vol. x. p. 147), Mr. Strickland has ascertained that the bone-bed occurs at least ten miles further north, or at Defford Common, in Worcestershire, making a total range of 104 miles. At this locality are some old salt-works belonging to the Earl of Coventry, and the shaft, which was sunk about seventy years ago to the depth of 175 feet, was emptied a few months since of the brine with which it is wont to overflow. At the bottom of the shaft, which descends through the lias into the grey marl of the triassic series, but without reaching the red marl, is a tunnel that follows the dip of the strata for about 160 yards. The shaft, Mr. Strickland says, consequently intersects the horizon of "the bone-bed," and among the rubbish thrown out, he found considerable quantities of the peculiar white sandstone with bivalves (*Posidonomya*), shown in his former paper to represent in Worcestershire the bone-bed of Aust and Axmouth; but he also found specimens of the sandstone charged with the same description of teeth, scales and coprolites so abundant at Coomb Hill and the localities just mentioned.

The occurrence of an abundance of pure salt water within the area of lias, Mr. Strickland says, is an interesting phenomenon, and for a solution of it, he refers to Mr. Murchison's Account of the Geology of Cheltenham, p. 30.

June 29.—"On the minute Structure of the Tusks of extinct Mastodontoid Animals." By Alexander Nasmyth, Esq., F.G.S.

The author, at the commencement of his memoir, acknowledges his obligations to Dr. Grant for having first called his attention to the

minute anatomical structure of the tusks of Mastodontoid animals; and for having placed at his disposal a copy of the Swedish edition of Retzius's demonstration of the typical structure of the dental organs of animals.

Availing himself of the able tuition afforded by the Swedish Professor, Mr. Nasmyth says, he has prosecuted the subject, and that these inquiries, besides explaining to him the structure of that portion not completely investigated by Retzius, have unfolded to him some observations which are now generally acknowledged to be truths in the valuable but intricate department of animal development. He further says, that he has been led to results differing somewhat from those of Retzius, so far as the physiology of the cellular tissues is concerned; yet the general appearances exhibited and the manner of displaying them will remain, he adds, lasting memorials of the talents and ingenuity of the Swedish Professor.

The specimens to which Mr. Nasmyth's attention has been directed form part of the collection of Mr. Koch, and they were delivered to him as belonging to *Mastodon giganteum*, *Tetracaulodon Godmani*, *T. Kochii*, *T. Tapiroides*, and the *Missourium*. In the analysis of each specimen he considers—

1st. The constituent structures of the tusk.

2nd. The comparative extent of each of the constituent structures, as far as it can be ascertained.

3rd. Each constituent structure regarded separately in its minute and individual elements.

4th. The conclusions derived from the premises as to the place which the animal should occupy in zoological classifications.

The principle upon which this mode of analysis is based, is that of the infinite variety which nature affects from limited materials, while the constancy of each variety throughout the same species is perfect. This constancy extends, Mr. Nasmyth observes, not only to the constituent structures of each tooth, but to the extent of each constituent, as well as to the peculiar arrangement of the minute elements of which each of these structures is composed.

The examination of each tusk evinces so marked and peculiar a structure, that a cursory inspection will, the author thinks, sufficiently demonstrate specific distinctions, which he supposes must have been accompanied by concomitant peculiarities of organization subservient to separate and distinct habits.

In the following descriptions the word *corpuscule* is used to designate those appearances constituting the characteristic of bone, but denominated by Retzius *cells*, because the author is persuaded that those appearances are truly of a corpuscular character; and the word *cell* is used to designate the structure of the interfibrous material which was left almost entirely out of account by Retzius, and described by others as structureless, but demonstrated by the author to be most characteristically organized in the different groups of animals. The term *fibres* is used, moreover, to define those appearances which Retzius considers due to a tabular structure, because the author has been unable to find anything which confirms this theoretical

appellation founded on the existence of a series of continuous ramifying tubes. This question therefore he leaves in abeyance.

Mastodon giganteum.—The constituent structures of the upper tusks are only two, *crusta petrosa* and *ivory*. The crusta petrosa, in the specimens examined, is comparatively thin, or about half a line; but the extent of the investigation being necessarily limited, the author considers that the observations on this head are incomplete.

The corpuscules of the *crusta petrosa* are scattered irregularly; but they are numerous and give off radiating branched fibres, tending generally either from the surface or to the surface of the tusk. There are hardly any independent fibres. The cellular structure of the interspaces is clearly marked.

The junction of the *ivory* with the *crusta petrosa* is well defined by a clear line, succeeded by a plumose appearance arising from a congeries of very minute ramifying fibres. This appearance looks, Mr. Nasmyth says, as if it arose out of, and formed the termination of, the main fibres which join the layer undivided.

The compartments of which the main fibres are made up are parallelograms resembling those of the Elephant, and are most easily observed in vertical sections, while the cellular structure of the interfibral spaces is clearest in transverse sections. Minute corpuscular appearances are scattered over the substance, and so aggregated as to form at intervals concentric layers. The characteristic differences between the structure of the tusks of the Elephant and Mastodon, Mr. Nasmyth observes, consist principally in the presence of transverse fibres in the *crusta petrosa* of the Elephant, and the greater number and regularity of its corpuscules in the Mastodon, as well as in the peculiar disposition to a transverse direction of its radiating fibres. In the ivory the most striking peculiarity consists in the numerous bands of corpuscular-looking bodies in its substance. These appearances, so frequently observed in ivory, Mr. Nasmyth is of opinion, depend, as pointed out by him, on the thickness of the animal matter of the interfibral cells.

Tetracaulodon Godmani.—The author says there is a great dissimilarity in the constituent structures of tusks of this Pachyderm and those of the Mastodon, while on a cursory examination of the minute organization of these structures there is an apparent similarity. The crown of both the upper and under tusk is coated with enamel extending below the level of the alveolar process, with *crusta petrosa* external to it, the body of the tusk being composed of ivory. The alveolar process of the upper tusks is large and deep, greatly exceeding that of every other tusk which the author has examined, and showing, he says, that the actions in which these organs assisted, must have been very powerful.

The habits essentially necessary to the exigencies of an animal being, Mr. Nasmyth observes, the same in youth as in adult age, the organization of the individual tissues is the same at both periods, though certain modifications of instruments are exacted at successive stages of existence. Thus, in early youth, when the frame is not powerful, every efficiency is given to the cutting edges of the dental

apparatus ; and the author states a fact he believes never before remarked, though long noticed by himself, that the tusks of the young Elephant and Walrus are tipped with a very thin layer of enamel.

The head of the *Tetracaulodon Godmani* examined by Mr. Nasmyth is shown to have been that of an animal in which two of the adolescent teeth are well developed. The crusta petrosa of the tusk was about half a line thick, and extended over the whole of the visible surface. The corpuscules were irregularly disposed, but closely aggregated, and exhibited in the transverse section an irregularly circular shape with occasionally angular points. The radiating fibres were numerous, ranging in all directions ; and the independent transverse fibres were also numerous, traversing with a curved course the whole substance. The cells of the interspaces were visible. The enamel on the upper tusk was a line thick. The parallel rows of constituent cells throughout the external half ranged in straight lines, but throughout the internal half they were curved diagonally. There was no clear space between the enamel and ivory, but the line of junction was well defined. A plumose layer of fibres, apparently the peripheral termination of the main undivided fibres of the ivory, succeeded to the enamel. The component bulbs of the fibre were round, but not often visible, and were best seen in the longitudinal section. The fibres were placed at about the distance of two interfibral spaces, and curved in the transverse section as well as in the vertical, but in the latter direction slightly. A minute corpuscular appearance was scattered over the substance, and the cells of the interfibral material were visible.

The crusta petrosa, enamel and ivory of the under tusk were similar to those of the upper, except that the constituents were so transparent as hardly to betray any characteristic. The parietes of the cells of the enamel are more defined in the under tusk.

Besides the important characteristic of the thick coating of enamel, the tusk of the *T. Godmani* presents manifest differences from that of the other species, in the elements of each of the constituents. The radiating fibres of the corpuscules differ from those of *Mastodon giganteum* in being given off equally in all directions : in the *M. giganteum* the numerous independent fibres of the *T. Godmani* are also absent, and the zones or belts of minute corpuscules in the ivory of the *M. giganteum* are wanting in that of the *T. Godmani.*

Tetracaulodon Kochii.—The tusks of this Pachyderm have only two constituents, *crusta petrosa* and *ivory.* The crusta petrosa varies in thickness, equalling in some parts an inch. In the vertical section the corpuscules are irregularly oval and irregularly disposed at the distance of three or four corpuscular diameters, and they give off occasionally many fine radiating fibres. Numerous independent transverse fibres pass in a curved direction also throughout the substance, their beaded or minute corpuscular appearance being very visible, and they are of an irregularly twisted oval form. The cells of the interspaces are likewise visible.

The ivory of the upper tusks consists of very slightly undulating, undivided fibres, with the cells of the interfibrous substance well

marked, but semi-transparent. The fibres of the under tusk slightly undulate, and present occasionally an appearance of thorny projections. The compartments of the fibres are easily seen, and are irregular in size, but rounded.

Tetracaulodon Tapiroides.—The tusks consist also of only *crusta petrosa* and *ivory*, and the resemblance in the microscopic structure of this species with that of *T. Kochii* is great. The thickness of the crusta petrosa is considerable. The very irregularly-shaped corpuscules, placed at intervals of two or three corpuscular diameters, are semi-transparent, and without radiating fibres in the external half; but those situated in the internal half are of the usual opacity, and give off numerous radiating fibres. Transverse, irregularly beaded, independent fibres traverse the substance, making one distinct curve in their passage across it. The cells of the interspaces are slightly visible.

The ivory is so translucent and homogeneous as to exhibit generally very little character. The fibres undulate but do not divide, forming an abrupt line of junction with the crusta petrosa. The form of the beaded compartments of the fibre is oblong, not rounded, as in *T. Kochii*, and they do not exhibit thorny projections. These are the only marked differences in the two species.

The cells of the semi-transparent interfibral space are generally visible.

Missourium.—The constituents of the tusks are likewise *crusta petrosa* and *ivory*; but their intimate structure, Mr. Nasmyth says, is more peculiar, so far as his examination has extended, than that of the tusks of the preceding animals.

The crusta petrosa, in the section which the author was permitted to make, was more than three-eighths of an inch thick. The corpuscules were very numerous, and generally within the distance of one diameter. The granulated compartments of which the corpuscules were composed, were very visible, and often without radiating fibres, but where these occurred they were of a coarse structure. The transverse independent fibres were beaded in coarse, somewhat tortuous, ovoid compartments, and ranged very close to one another, with interfibral spaces of about only two fibral diameters, and followed a straight, perpendicular and parallel course to the surface. The cells of the semi-transparent interfibral space were generally visible.

The appearances presented by the ivory at its junction with the crusta petrosa, Mr. Nasmyth was unable to ascertain; but in the substance of the ivory the fibres undulated, and their beaded compartments had a rounded shape: these fibres were frequently invested with an irregular congeries of granules distinct from the interfibral cells. Towards the central portion of the ivory the compartments forming the fibre were frequently so disposed as to give the fibre a peculiar tortuous appearance.

The peculiarities of the tusk of the Missourium are given by Mr. Nasmyth as follows; and, he says, they would certainly indicate a distinct species of Mastodontoid animal:—

1. The great extent of the crusta petrosa. 2. The close aggre-

gation of its corpuscules. 3. The granulated structure of these corpuscules. 4. The coarse granulated structure of the compartments of the radiating fibres. 5. The close parallel perpendicular arrangement of the fibres of the crusta petrosa. 6. The irregular congeries of granules surrounding the fibres of the ivory. 7. The peculiar tortuous appearance occasionally exhibited by these fibres.

On the whole, Mr. Nasmyth observes, the several species of animals noticed in his paper seem to be nearly allied, and fitted to exist under nearly similar conditions; and though the early eras to which these Pachyderms must be referred, present, he says, considerable uniformity of circumstance, yet they must have demanded some variety of detail in the animal organization.

Finally, the characteristics in the minute structure of the tusks of all the five animals betray, the author observes, greater varieties than are found to exist even betwixt some genera possessed of tusks; and if it be established that specific differences positively do exist among all these animals, then the value of this kind of observation is great; but if the five animals are all to be grouped in one category, then this mode of observation is of no value in palæontological researches.

Nov. 16.—"On some remarkable Concretions in the Tertiary beds of the Isle of Man." By H. E. Strickland, M.A., F.G.S.

The north extremity of the Isle of Man consists of an arenaceous pleistocene deposit, occupying an area of about eight miles by six, bounded on the west, north and east by the sea, and on the south by the mountains of Cambrian slate which occupy the greater portion of the island. The arenaceous formation attains in some parts a height of about 200 feet above the sea, though the undulations of its surface prove that considerable portions of the deposit have been removed by denudation. This district, comprising about fifty square miles, furnishes perhaps the most extensive example in the British Isles of a marine newer pliocene or pleistocene deposit. In the Isle of Man the sea-cliffs on each side of this tertiary district afford a good insight into its structure and composition. On the north of Ramsey the cliffs average about 100 feet in height, and consist principally of irregularly stratified yellowish sand, sometimes clayey, with interspersed bands of gravel and scattered pebbles. The gravel is chiefly composed of slate-rock, quartz, old red sandstone, granites, porphyries and chalk flints, all of which occur *in situ* in the island except the two last, which may have been drifted, the former from Scotland, and the latter from the north of Ireland. About four miles north of Ramsey the cliffs attain 150 feet. Here the lowest portion, only visible at intervals, is a brownish clay loam, and the remainder of the cliff is sand and coarse gravel, less distinctly stratified than is the case near Ramsey, and containing rudely rounded boulders, some of which are upwards of a ton in weight. They consist of granite, and occasionally of carboniferous limestone.

Organic remains are sparingly diffused in this deposit: Mr. Strickland enumerates twenty species. Of these five, viz. *Crassina multicostata, Natica clausa, Nassa monensis, Nassa pliocena,* and *Fusus Forbesi* are not known in the British seas. *Crassina multicostata*

and *Natica clausa* are found living in the Arctic ocean, but the two species of *Nassa* and the *Fusus* are unknown in a recent state*.

Between three and four miles north of Ramsey, the beds of this deposit occasionally exhibit a very remarkable concretionary structure. The sand has here been cemented into masses, which are extremely hard, and even sonorous when struck, though the sand in which they are imbedded is perfectly loose. The cementing ingredient, which the application of acid proves to be carbonate of lime, seems to have been influenced in its operations partly by the planes of stratification, and partly by the direction in which the sand has

* Mr. Strickland gives the following characters of three species of shells found in the newer pliocene beds of the Isle of Man; specimens of which have been examined by several eminent conchologists in London, who all concur in believing them to belong to extinct species.

"1. *Nassa monensis*, Forbes, in Mem. Wern. Soc., vol. viii. p. 62. Small; volutions about six, rounded; suture deep; ribs, nine on the first volution, straight, rather distant, strong, subacute, and slightly oblique. The first volution has thirteen, and the second six, distinct, regular, thread-like, spiral striæ, crossing alike the ribs and their interstices. Aperture orbicular-ovate, canal very short and oblique, pillar-lip simple, outer lip with about five slight marginal denticles on the inside, and an external rib slightly more developed than the ordinary ribs. Total length, 7 lines; first volution, 3¾ lines; breadth, 4⅓ lines; angle of spire, 40°.

"*Obs.* Resembles the recent *N. macula*, but is larger, more ventricose, has fewer ribs, and the terminal rib is less suddenly developed.

"2. *Nassa pliocena*, Strickland, 1843. Large; volutions about seven, rather flat, with a distinct thread-like suture; ribs, twelve on the first volution, straight, distant, rounded, very slightly oblique; the interstices flat, exceeding the width of the ribs by one-half. The first volution with thirteen, and the second with about nine fine spiral striæ, only visible in the interstices, the ribs being smooth; but this may be due to attrition. Aperture ovate; canal very short and oblique; pillar-lip with about five obscure denticles, and a spiral groove immediately behind the canal, continued into the interior of the shell. Outer lip with about eight internal marginal denticles; no rib at the back. Total length, 1 inch 8 lines; first volution, 8 lines; breadth, 9 lines; angle of spire, 40°.

"3. *Fusus Forbesi*, Strickland, 1843. *Fusus* nov. sp. Forbes, Malacologia Monensis, pl. 3. f. 1. Middle-sized; volutions about six, slightly rounded, suture distinct; ribs, eleven on first volution, straight, rounded, smooth (perhaps from attrition); interstices concave, and hardly wider than the ribs. First volution with about fifteen, and second with about seven distinct, rather irregular spiral striæ, of which those on the first volution are alternately large and small. They are only visible in the interstices of the ribs. Aperture ovate, double the length of the canal, which is straight, and rather oblique to the left. Pillar-lip smooth, with one obscure denticle at the posterior end. Outer lip with about ten small linear denticles within, continued a short way into the mouth, and a well-marked external rib remote from the margin. Total length, 1 inch 3 lines; first volution, 7 lines; breadth, 8 lines; angle of spire, 43°.

"*Obs.* This species belongs to a group of *Fusus* which seems closely allied to *Nassa*. First described by Mr. E. Forbes, from a worn specimen found on the coast of the Isle of Man, and supposed by him to be an existing species, but the discovery of additional specimens *in situ* proves it to be a genuine fossil."

been originally drifted by currents. In the former case the concretions are in the form of flat tabular masses parallel to the stratification, often mammillated on their surfaces, or perforated obliquely by tubular cavities. In the latter case they assume a subcylindrical or spear-shaped form, and occur parallel both to the stratification and to each other. A pebble is frequently attached to the larger end of the concretion, which springs from it as from a root, to the length of a foot or more, and gradually terminates in an obtuse flattened point. All these varieties are sometimes combined together into vast clusters of several tons weight, resembling masses of stalactite, the component portions being nearly parallel to each other. Mr. Strickland supposes that currents of water (or possibly of wind, operating during ebb tide), flowing in a certain direction, may have disposed the sand in ridges parallel to that direction, and the carbonate of lime may have afterwards been attracted into these ridges in preference to the intermediate portions. This view is confirmed by the fact, that these concretions have frequently a pebble attached to the larger end, as though it had protected a portion of sand from the current, and caused it to accumulate in a ridge on the lee side, a circumstance which may frequently be observed where sand is drifted by the wind or water.

Nov. 30.—"Notice on the discovery of the Remains of Insects in the Lias of Gloucestershire, with some remarks on the Lower Members of this Formation." By the Rev. P. B. Brodie, F.G.S.

The lower beds of the lias, in which these organic remains occur, are extensively developed in the neighbourhood of Gloucester and Cheltenham, and occupy the greater part of the vale. In the upper part of the lower beds, in a hard blue limestone, was found the elytron of a coleopterous insect of the family *Buprestidæ*, apparently a species of *Ancylocheira* of Escholtz. This was the only fossil of the kind met with by Mr. Brodie in this portion of the lias. With this exception, the numerous fossil insects he has obtained occur in the bottom parts of the lower beds near the base of the lias, which are seen at several points in the neighbourhood of Gloucester. At Wainlode Cliff, the lower beds of lias, resting on red marl, form a bold escarpment on the south bank of the Severn, and afford the following section in descending order:—

1. Clay: 3 ft.
2. Blue limestone, with *Ostrea*, &c. (the "bottom bed"): 4 in.
3. Yellow shale with fucoid plants: 6 in.
4. Gray and blue limestone, termed by Mr. Brodie "insect limestone" from its characteristic fossils, passing into yellow shale above, where it is nearly white, and has the aspect of a fresh-water limestone: 3 to 5 in.
5. Marly clay: 5 ft. 3 in.
6. Hard yellow limestone, with small shells like *Cyclas*, plants and *Cypris*: 6 to 8 in.
7. Marly clay: 9 ft. 6 in.
8. Bed with fucoid bodies: 1 in.
9. Shale: 1 ft. 6 in.
10. Pecten bed: 4 in.

Nine feet below this is the bone-bed, 20 feet above which is the yellow *Cypris* limestone, and 26 feet 2 inches the insect limestone. The total height of the cliff is about 100 feet.

The insect remains consist chiefly of elytra belonging to the several genera of Coleoptera, which are not very rare; and a few wings, not unlike the genus *Tipula*, which bear a close resemblance to some Mr. Brodie had previously found in the Wealden; the latter are much rarer than the former. The elytra are generally of a light brown colour and small size; in some cases both the elytra are attached. With these were found abdomens of some insects and larva apparently of the gnat tribe. Shells are not common, but *Ostrea*, *Unio*, and a small species of *Modiola* are the most abundant. The fossils from the yellow limestone, No. 4, bear a close resemblance to those from the Wealden. The real genus of the bivalve resembling *Cyclas* is undetermined. The plants belong to a species of Fucus, apparently an inhabitant of fresh water. At Combe-hill Mr. Brodie also observed both the insect limestone and that containing the small bivalves. To the south-west of this point the insect limestone is well seen, and yielded the greatest number and variety of insect remains. Here the yellow limestone was not traced, and the bone-bed was wanting. The fossil insects are, as at Wainlode Cliff, for the most part remains of small Coleoptera, sometimes tolerably preserved, and in one specimen the eyes were visible. None of the beetles resemble those of the Wealden, but some wings of insects, allied to *Tipula*, are very similar. A few imperfect but large wings of *Libellula* occur: there are also numerous singular impressions of a doubtful nature, many of which may however owe their origin to the partially decomposed bodies of various insects. With these are numerous small plants, some resembling mosses, but very different from those in the yellow *Cypris* limestone, a few seed-vessels and leaves of fern. A small species of *Modiola*, probably *M. minima*, is exceedingly abundant. Remains of Crustacea occur, one of which resembles the genus *Eryon* from the Solenhofen slate.

Near Gloucester the same strata occur at a much lower level. At Westbury, eight miles below Gloucester, the following section is presented:—

1. Bottom bed with *Ostrea*, equivalent to that at Wainlode and other places: 3 in.
2. Insect limestone with numerous small shells (here characteristic): 4 in.
3. Clay: 5 in.
4. Green, yellow and gray sandy stone, in places becoming a limestone, with the small *Cyclas*-like bivalve, plants and *Cypris*, identical with those at Wainlode, about 1 ft.
5. Shale and clay: 10 ft.
6. Hard grit, bone-bed: 3 or 4 ft.

A little further to the north the beds below this are more developed and are seen resting upon the red marl.

If the *Cypris* found in these beds be of freshwater origin, it forms a new and highly interesting feature in the history of this deposit; at any rate the occurrence of the remains of such delicate creatures

as insects, many of which are well-preserved, and could not, therefore, have been long subject to the action of the waves, or have been carried far out into the water, gives a greater probability to the supposition that this part of the lias may have been formed in an estuary which received the streams of some neighbouring lands, perhaps numerous scattered islands, and which brought down the remains of insects, *Cypris*, and the plants above referred to. The shells usually found in the insect limestone are *Modiola* and *Ostrea*, both of which frequently inhabit estuaries, and are capable of living in brackish water as well as in the open sea. The shells, however, so abundant at Westbury in the same stratum are exclusively of marine origin; the wing of a dragon-fly from Warwickshire is a solitary instance of its kind. Mr. Brodie observes, that such stray specimens had probably been carried out to sea, which might also have been the case with a small wing he discovered in the *upper lias* at Dumbleton near Tewkesbury; which also proves the existence of insects during the deposition of the upper portions of this formation.

Thus it will be seen that the remains of insects are of very rare occurrence in the upper beds, and in the higher portions of the lower ones in the lias, while at the base near its junction with the red marl they are abundantly distributed. The discovery of small elytra of coleopterous insects and portions of the wings of *Libellula* in the lower division of the lias near Evesham, by Mr. H. E. Strickland, shows that these fossils are characteristic of the same beds in distant parts of the system.

" On certain impressions on the surface of the Lias bone-bed in Gloucestershire." By H. E. Strickland, M.A., F.G.S.

The singular markings described, which the author in a former communication suggested might be caused by the crawling of crustacea, but which further opportunities and observations have induced him to refer to a different cause, have been noticed only at Wainlode Cliff on the Severn. There they occur on the uppermost surface of the band of micaceous sandstone which represents the " bone-bed," and which appears to have consisted of a fine-grained muddy sand, capable of receiving the most minute impressions, while the pure black clay which forms the superincumbent stratum has preserved this ancient surface in the most unaltered condition. The ripple-marks produced by currents on the surface of this bed of sand are very interesting, from their perfect preservation, and from often exhibiting two sets of undulations oblique to each other, indicating two successive directions in the currents, such as would result from a change of tide.

The impressed markings were evidently produced by living beings, probably by fish or invertebrate animals. To determine their nature Mr. Strickland observed the progression of two species of *Littorina* among Gasteropodous Mollusca, and of *Carcinus Mœnas* among Crustacea, but the impressions produced were very different from those under consideration.

The fossil impressions are of four kinds :—

1st. Lengthened and nearly straight grooves, about one-tenth of

an inch in width, and several inches long, very shallow, with a rounded bottom. These, Mr. Strickland considers as caused by some object striking the surface of the sand with considerable impetus. They may often be seen to cut through the ridge of one ripple-mark, and after disappearing in the depressed interval, they are again seen pursuing their former direction across the next ridge. They may have been caused by fish swimming with velocity in a straight direction, and occasionally touching the bottom with the under part of their bodies.

2nd. Small irregular pits averaging one-fourth of an inch wide and one-eighth of an inch deep. These might have been caused by some small animal probing the mud and turning up the surface in quest of food. Mr. Strickland conjectures that some of the numerous species of fish found in the bone-bed may have produced them, the heterocene form of tail common to most of which, Dr. Buckland has suggested, enabled them to assume an inclined position with the mouth close to the ground.

3rd. Narrow deep grooves, about one-twelfth of an inch in width, the sides forming an angle at the bottom, irregularly curved and often making abrupt turns, apparently formed by a body pushed along by a slow and uncertain movement, such as might arise from the crawling of Mollusks. Mr. Strickland refers them to the locomotion of Acephalous Mollusca, and supposes that the only shell found in this bed, a small bivalve named by him *Pullastra arenicola*, might have produced them*.

4th. A tortuous or meandering track consisting of a slightly raised ridge about one-tenth of an inch wide, with a fine linear groove on each side. These tracks are analogous to those formed by the crawling of small annelidous worms, as may often be seen on the mud of the sea or fresh water.

About eleven feet above the stratum which presents the impressions above described, a second ossiferous bed occurs at Wainlode Cliff, which escaped Mr. Strickland's notice in the section formerly given (Geol. Proc. vol. iii. p. 586). It is a band of hard, grey, slightly calcareous stone, about an inch thick, containing a plicated shell resembling a *Cardium*, and scales and teeth of *Gyrolepis tenuistriatus*, *Saurichthys apicalis*, *Hybodus Delabechei*, *Acrodus minimus*, and *Nemacanthus monilifer*, all of which occur in the true "bone-bed" below. On the upper surface of that bed are numerous impressions, termed by Mr. Strickland fucoid, consisting of lengthened wrinkled grooves, variously curved, about three quarters of an inch wide, one-eighth of an inch deep, and of variable length. The bone-bed seems to be a local deposit, not being met with in the other localities examined by the author, and being confined to a

* Mr. Strickland describes this species as follows:—"Its form is nearly a perfect oval, depressed, nearly smooth, but with faint concentric striations towards the margin. The apex is about halfway between the middle of the shell and the anterior end. The general outline closely resembles that of the recent *Pullastra aurea* of Britain. Maximum length 7 lines, breadth 4½ lines, but the ordinary size is less."

portion only of Wainlode Cliff, where it constitutes No. 9. in the following corrected section :—

	Ft.	in.
1. Blackish lias clay	3	6
2. Limestone, with *Ostrea* and *Modiola minima* (the bottom bed)	0	4
3. Yellowish shale	1	0
4. Limestone, with remains of insects	0	4
5. Marly shale and clay	5	3
6. Yellowish limestone nodules, with occasional remains of *Cypris*	0	6
7. Yellowish marly clay	6	0
8. Black laminated clay	3	6
9. Stone, with scales and bones of fish, and on the upper surface fucoid impressions	0	1
10. Black laminated clay	1	6
11. Slaty calcareous stone, with Pectens	0	4
12. Black laminated clay	9	0
13. Bone-bed and white sandstone, with casts of *Pullastra arenicola*	0	3
14. Black laminated clay	2	0
15. Greenish angular marl	23	0
16. Red marls with greenish zones	42	0
	98	7

Jan. 4, 1843.—"Notice on a Suite of specimens of Ornithoidicnites, or foot-prints of Birds on the New Red Sandstone of Connecticut." By Gideon Algernon Mantell, LL.D., F.R.S.

These specimens were accompanied by a letter from Dr. James Deane of Greenfield, Massachusetts, the original discoverer of the Ornithoidicnites, of which more than thirty varieties had been found, bearing a striking resemblance to the foot-prints of birds. In this letter Dr. Deane gives an account of his discovery of the impressions eight or nine years ago, and which he then communicated to Professor Hitchcock. He remarks, that "the footsteps are invariably those of a biped, and occur on the upper surface of the stratum, while the cast or counter-impression is upon the lower. In some instances we may follow the progress of the animal over as many as ten successive steps." He has seen a course of steps twelve inches in length by eight in breadth, extending several rods. The intervening space was uniformly four feet. One impression of a foot was fourteen inches in length. The impressions are accompanied by those of rain-drops.

Extract of a Letter from W. C. Redfield, Esq., on newly discovered Ichthyolites in the New Red Sandstone of New Jersey. Communicated by Charles Lyell, Esq., V.P.G.S.

Mr. Redfield has found two distinct fish-beds in the new red sandstone of New Jersey, both containing ichthyolites of the genus *Palæoniscus*. In the sandstone between the fish-beds he discovered an Ornithoidicnite, and observed numerous slabs exhibiting impressions

of rain-drops and ripple-marks. The rain-marks appear as if the rain had been driven by a strong wind, and the direction of the impressions indicated that the wind blew from the west, a quarter from which violent squalls or thundergusts are still prevalent in these latitudes.

ZOOLOGICAL SOCIETY.

July 26, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

The following memoirs were read:—

"Observations on the Semen and Seminal Tubes of Mammalia and Birds," by George Gulliver, F.R.S.

It has long been known that the testicles of Birds become much enlarged in the spring, and that the same organs of Mammalia are more or less increased in size at the rutting-season, and in young animals generally as they become capable of reproduction. Professor R. Wagner ('Physiology,' translated by Willis, pp. 23 and 27) has noticed also the enlargement of the seminal tubes of all these animals at the periods above named; but as I am not aware that we possess any observations on this head sufficiently numerous and precise to be useful for reference and comparison, I am induced to submit to the Society a contribution towards this object, particularly as it appears to me that the condition of the semen and testicles at different periods is an interesting inquiry in relation to the habits and economy of animals.

During winter the coats of the seminal tubes of Birds are tolerably strong and thick. The increased size of the tubes at the season of procreation arises from the accumulation of semen within them, by which their coats are so much distended and attenuated that they are most easily ruptured, and are much thinner than the corresponding parts of Mammalia are at any time.

In the following table the measurements are all expressed in vulgar fractions of an English inch*, and where only one fraction is given it denotes the average size. With the exceptions dated November and December, the animals were all examined during the present year, and, unless noted to the contrary, they were adults. In Birds the left testicle, which is commonly somewhat larger than the right, was generally the subject of observation.

Table of Measurements of the Seminal Tubes, and of remarks on the state of the Semen and Testicles at different seasons.

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
Feb. 4.	Man, æt. 22	1-142 to 1-77	Scarcely any fluid in testes. Died of pulmonary consumption.
Nov. 9.	Ditto, æt. 56	1-150 to 1-73	Died of chronic pericarditis. No spermatozoa.

* I take this opportunity of remarking, that all my microscopic measurements have been invariably given in vulgar fractions of an English inch, however they may have been set up in type for the sake of convenience.

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
Nov. 11.	Man, æt. 53	1-150 to 1-80	Died of pericarditis, enlarged heart, and old pleuro-pneumonia. A few spermatozoa in epididymis.
Dec. 7.	Ditto, æt. 42	1-133 to 1-86	Died of phthisis. Some spermatozoa in epididymis.
Nov. 14.	Ditto, æt. 73	1-133 to 1-73	Died of phthisis. Tubes filled with dark, round, and very minute particles; these chiefly aggregated together in irregular masses, and occasionally in the form of round or oval corpuscles with delicate cysts. No spermatozoa.
Nov. 17.	Ditto, æt. 60	1-146 to 1-82	Died of phthisis. Seminal tubes in the same condition as the preceding.
Dec. 10.	Ditto, æt. 86	1-160 to 1-100	Died of pneumonia. Had fatty matter in liver, lungs, and testes; no spermatozoa; tubes in the same condition as in the two preceding.
Aug. 25.	Child, æt. 8	1-422	Died of pulmonary consumption.
Dec. 1.	Child, æt. 18 months	1-400 to 1-266	Child puny and emaciated. Died of pneumonia.
July 15.	Child, æt. 4 months	1-308	Died of tubercles of mesenteric glands.
Oct. 25.	Child, æt. 6 weeks	1-333 to 1-230	Body much emaciated. Died of pneumonia.
Aug. 25.	Child, still-born	1-307	Well-nourished fœtus; born at the full period of utero-gestation.
Oct. 14.	Ditto	1-363 to 1-210	Fœtus weighed 7 lbs.
Oct. 23.	Ditto	1-300 to 1-222	Fœtus weighed 6 lbs.
Nov. 5.	Ditto	1-400 to 1-266	Weight of fœtus 5½ lbs.
June 15.	Vespertilio Pipistrellus, *Geoff.* ..	1-200 to 1-171	Seminal matter containing abundance of molecules, but no spermatozoa.
June 15.	Erinaceus Europæus, *Linn.* ...	1-109 to 1-75	No animalcules. Died of disease.
April 30.	Sorex tetragonurus, *Herm.*	1-109 to 1-85	Semen and spermatozoa very abundant. Many male shrews found dead, with marks of injuries, apparently from fighting; and in

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
			all these the testes were very turgid.
July 16.	Canis familiaris, *Linn.*	1-125 to 1-85	A mongrel. Spermatozoa abundant.
Feb. 15.	Ditto; a still-born puppy	1-250	
Dec. 30.	Felis Leo, *Linn.* (3 years old)...	1-200 to 1-150	Died of disease of the brain. Molecules abundant, and a few cells containing spermatozoa.
Nov. 6.	Felis domestica, *Briss.* (nine months old)	1-141 to 1-85	Spermatozoa plentiful.
Oct. 4.	Arctonyx collaris, *F. Cuv.*	1-100 to 1-60	Tubes large. Spermatozoa rather plentiful. Some cells and numerous molecules. Died in confinement.
Oct. 15.	Ursus Americanus, *Pall.*	1-200 to 1-125	No spermatozoa. Seminal tubes full of dark-coloured pulp, in which were only visible some altered epithelial cells and numerous oily globules. Died in confinement.
Jan. 6.	Mustela vulgaris, *Linn.*	1-171 to 1-109	Molecules plentiful in semen; no spermatozoa.
May 20.	Mustela erminea, *Linn.*	1-120 to 1-80	Spermatozoa plentiful; scarcely any molecules.
April 30.	Cervus Wapiti, *Mitch.*	1-160 to 1-100	Many perfect spermatozoa; molecules scanty; animal 24 months old. Died of diseased kidneys.
Jan. 12.	Cervus Elaphus, *Linn.*	1-117 to 1-105	Perfect spermatozoa very abundant; many in different stages of development.
Jan. 12.	Cervus Dama, *Linn.*	1-160 to 1-100	Perfect spermatozoa very numerous; many in cells.
April 6.	Ditto	1-160 to 1-100	Spermatozoa abundant; none in cells.
Jan. 26.	Ditto, fœtus 6 inches long	1-666 to 1-363	Tubes full of corpuscles about 1-2800th of an inch in diameter: no molecules.
March 26.	Ditto, 14 inches long	1-333 to 1-285	Ditto.
June 22.	Antilope picta, *Pall.*	1-120 to 1-80	Semen and spermatozoa abundant.
Dec. 31.	Ditto (died a few hours after birth)	1-571 to 1-363	Contents of tubes as in other immature animals.
May 28.	Capra Hircus, *Linn.* (12 weeks old)	1-266 to 1-171	Semen containing abundance of molecules, and rudimentary spermatozoa in cells.

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
Feb. 24.	Ovis Aries, *Linn.* (just born) ...	1-571	Tubes very small.
Nov. 2.	Camelus Dromedarius, *Linn.* ...	1-120 to 1-75	Died of dropsy. Spermatozoa plentiful; some rudimentary in cells, with corpuscles; molecules scanty.
Dec. 10.	Sciurus vulgaris, *Linn.*	1-120 to 1-60	A few spermatozoa.
Nov. 29.	Lepus cuniculus, *Linn.*	1-150 to 1-92	But few spermatozoa.
Jan. 18.	Mus decumanus, *Linn.*	1-46 to 1-42	Spermatozoa very abundant; tubes large.
Jan. 18.	Ditto, two-thirds grown	1-120 to 1-109	No spermatozoa.
Jan. 18.	Ditto ditto	1-133 to 1-120	Ditto.
Nov. 3.	Mus musculus, *Linn.*	1-80 to 1-66	Spermatozoa abundant.
Nov. 11.	Ditto, three-fourths grown	1-120 to 1-86	A few free spermatozoa; a great number immature in cells; molecules pretty abundant.
Feb. 17.	Ditto (blind sucking young one).	1-400 to 1-222	
May 5.	Strix flammea, *Linn.*	1-230 to 1-133	Died in confinement. Testis one-third of an inch long and one tenth broad.
March 16.	Corvus frugilegus, *Linn.*.....	1-75 to 1-46	Testis one inch long and three-fourths broad; semen and animalcules very abundant; no molecules.
Feb. 25.	Sturnus vulgaris, *Linn.*	1-250 to 1-166	Testis black, one-fifth of an inch long and one-eighth broad; no spermatozoa; molecules very abundant.
March 18.	Ditto	1-80 to 1-50	Testis brownish white, three-fourths of an inch long and four-tenths broad; spermatozoa abundant; no molecules.
April 27.	Philomela luscinia, *Sw.*	1-75 to 1-60	Testis one-fourth of an inch long and one-fifth broad, containing a little black pigment; spermatozoa abundant.
April 6.	Sylvia Phragmitis, *Bechst.*.....	1-68	Spermatozoa abundant; testis same size as the Nightingale's.
Jan. 9.	Fringilla domestica, *Linn.*	1-333 to 1-222	Testis one-twelfth of an inch in diameter; no spermatozoa.
Feb. 2.	Ditto	1-250 to 1-200	Testis one-twelfth of an inch in diameter; no spermatozoa; many molecules.
March 4.	Ditto	1-166 to 1-109	Testis one-seventh of an inch long and one-tenth broad; numerous cells, about 1-

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
			1000th of an inch in diameter; great abundance of molecules; no perfect spermatozoa.
May 3.	Fringilla domestica, *Linn.*	1-80 to 1-66	Testis one-third of an inch long and one-fourth broad; spermatozoa plentiful; molecules not abundant.
Feb. 28.	Fringilla Cœlebs, *Linn.*	1-90 to 1-71	Testis one-tenth of an inch in diameter; numerous cells containing rudimentary spermatozoa, but none perfect; molecules very numerous.
May 4.	Emberiza Citrinella, *Linn.*	1-80 to 1-60	Testis one-third of an inch long and one-fourth broad, containing a little yellow pigment; spermatozoa very numerous; molecules not abundant.
May 22.	Cuculus canorus, *Linn.*	1-100 to 1-66	Testis one-fifth of an inch in diameter, of an intense yellow colour; numerous staff-like bodies in semen 1-2666th of an inch long and 1-25,000th broad. Died in confinement.
Nov. 26.	Picus minor, *Linn.*	1-571 to 1-363	Testis size of a rape-seed; no spermatozoa or molecules.
May 31.	Cypselus Apus, *Flem.*	1-130 to 1-100	Testis one-third of an inch long and one-fifth broad; spermatozoa numerous; molecules scanty.
Dec. 5.	Columba Livia, *Briss.*	1-444 to 1-285	Testis about as big as a hemp-seed; no spermatozoa; a few molecules.
May 12.	Sterna Hirundo, *Linn.*	1-240 to 1-200	Testis one-tenth of an inch in diameter; no spermatozoa; molecules plentiful.

Molecules of the Semen.—The molecules mentioned in the preceding table are minute, smooth, circular particles, much resembling, both in chemical and physical characters, the "minute oil-like spherules" which I have depicted in the juice of the supra-renal bodies (Appendix to Gerber's Anatomy, p. 103). The "minute shining globules and smaller molecules," described by Professor R.

Wagner in the semen of some Mammalia, and the "apparently spherical and dense particles" observed by Dr. Davy (Researches, Physiological and Anatomical, vol. i. p. 332) in the fluid of the human testicle, and which particles he conjectures may be the ova of the spermatozoa, are perhaps identical with the molecules of the semen. They are commonly rather smaller than the particles of the supra-renal gland. I have made many measurements of the molecules of the semen, and find them generally to be 1-20,000th of an inch in diameter, but almost always varying from 1-35,000th to 1-8000th, and of course not at all approaching in size and other respects to the well-known corpuscles and cells of the semen. The molecules, especially those of larger size, refract the light strongly; the smaller ones appear dark and opake in the centre when the focus of the object-glass is elongated, and bright and transparent when the focus is shortened; while the smallest of all, like those of the supra-renal gland, often seem quite black or opake, and exhibit very lively vibratory motions, particularly when diluted with water or acetic acid.

That the molecules are connected with the perfecting of the semen, would appear from the fact that they are most abundant in birds and reptiles when the testicles begin to enlarge, and either wholly disappear or become scanty as soon as the testicles are perfectly ripe and the spermatozoa most completely evolved. But very minute vibratory particles are often observable in the seminal tubes of fœtal animals.

The figure of the molecules, like that of many other particles equally small, is apparently spherical, and, as already mentioned, they may present either a dark or bright central spot. But, as noticed in the Atlas to Gerber's Anatomy, p. 59, it is difficult to determine the exact shape of particles so exceedingly minute; and the elaborate researches of Dr. Barry (Phil. Trans. 1841, part 2) have rendered it probable that some of the particles which I have formerly mentioned (Appendix to Gerber's Anatomy, and London Medical Gazette for May and November, 1839) as "minute spherules" and "spherical molecules," are in reality discs.

Pigment.—In the foregoing table the black and yellow colour of the testicles of certain birds is noticed. I have carefully examined the black matter of the starling's testicles, and found it to be composed of very distinct pigmentary ramifications, made up of most minute particles, many of which, when floating in the field of vision, exhibit exceedingly active motions. In the winter the testicles are quite black, and the pigment, perhaps from the small size of the tubes, seems to be contained within them; but when the testicles are enlarged in the spring, they present a lighter or brownish white colour, from the accumulation of semen, and the pigmentary ramifications are evidently situated in or close to the coats of the tubes, the boundaries of which may be easily seen with a common handlens to be marked out by the black pigmentary dots.

Spermatozoa of the Cervidæ and Camelidæ.—Professor Wagner Physiology, by Willis, p. 34) regards the spermatozoa as essential

elements of the seminal fluid; and that the spermatozoa are essential to prolific semen seems now to be generally allowed. I merely mention the subject in connection with the statement of Sir Everard Home (Lectures on Comp. Anat., vol. v.; well commented on in Dr. Davy's Researches, vol. i. p. 339), that the seminal animalcules have no real existence, and especially that he and Mr. Bauer had searched for them in vain, and with the best instruments and opportunities, in the seminal fluid of the fallow deer during the season of the rut.

I now exhibit to the Society drawings of the spermatozoa of the fallow deer, wapiti, and red deer, and shall be happy to show my preparations of the animalcules to any one who may be curious about them. I have repeatedly had opportunities of examining the spermatozoa of the fallow deer, and though they are most abundant at the time of the rut, they may be found commonly enough at other seasons. After the rut was passed in January and February, I found the spermatozoa plentiful in the red and fallow deer at Windsor. The animalcules were even then in various stages of development; some coiled up two or three together, in cells, with granular matter; others were still more rudimentary; many appeared just ready to escape from the cells, while a still greater number were free and lively in the seminal canals. In the body of the spermatozoon of the red deer there is occasionally an appearance of internal granules or vesicles, as shown in the drawing.

As the *Camelidæ*, like the oviparous *Vertebrata*, have oval blood-corpuscles, it was interesting to ascertain the form of the spermatozoa of this ruminant family. In the dromedary I found that the seminal animalcules were much like those of other Mammalia, and so nearly resembling the animalcules of the *Cervidæ*, that there was a difference only of size, the spermatozoa of the dromedary being slightly smaller than those of the deer.

Chemical characters of the spermatozoa.—It is remarkable that the spermatozoa of Mammalia are but little or not at all affected by many chemical agents which quickly act on various other animal matters. These spermatozoa preserve their form and appearance when treated severally with nitric, muriatic, acetic, oxalic, tartaric and citric acids; with concentrated solutions of earthy, alkaline, and metallic salts; and with liquid ammonia.

But the spiral spermatozoa of birds are quickly dissolved, destroyed, or reduced to the most minute particles, by the acetic and other vegetable acids, while these animalcules are not much affected by muriatic acid, nor by caustic ammonia and saline solutions. Yet the cylindrical or club-shaped spermatozoa of birds are more nearly allied in chemical characters to the spermatozoa of Mammalia. The seminal animalcules of the common swift (*Cypselus Apus*), for example, remain perfectly entire and distinct after having been subjected to the action of citric or acetic acid. It may be incidentally mentioned that the spermatozoa of the snake (*Natrix torquata*) are not affected by acetic acid.

The matter in the seminal canals of Mammalia and Birds, when it

contains plenty of corpuscles, of which indeed it is almost entirely made up in immature animals, from the embryo upwards, is rendered ropy by alkalies and by saline solutions. This action of these solutions, which is very remarkable on all animal fluids containing a great quantity of fresh primary or isolated cells, appears to take place from the effect on them of the reagents, as I have elsewhere described with respect to the lymph-globules (Gerber's Anatomy, Appendix, pp. 91, 96, and 97). In some recent experiments, however, these globules were not destroyed, but only a little misshapen or made rather fainter, after having been kept some days in solutions of muriate of ammonia and other salts.

"Descriptions of new species of *Delphinula*, a genus of Pectinibranchiate Mollusks (Family *Turbinacea*)," by Mr. Lovell Reeve.

DELPHINULA TYRIA. *Delph. testâ subdiscoideâ, squameâ, anfractibus argenteo-albis, supernè et infernè Tyrio-purpureis, laxè convolutis, umbilicum lævem lacco-purpureum formantibus, angulatis, squamis minutis, in seriebus parallelis dispositis, totaliter tectis; angulo serie unicâ majore funiculato; spirâ depresso-planâ.*

Icones Reeve, Conch. Syst., vol. ii. pl. 211. f. 6.

Long. $2\frac{1}{2}$; lat. $1\frac{3}{4}$. Mus. Cuming, &c.

Hab. Ad oras Novæ Hollandiæ.

This is the first discovered large species of *Delphinula* that is absolutely destitute of spines or nodules. The surface of the shell, which is entirely covered with small scales ranged in parallel series, is of clear silvery white; the upper and lower portions of the whorls are tinged with a rich Tyrian purple, and the umbilicus, which is smooth, is of a lighter lake purple.

DELPHINULA IMPERIALIS. *Delph. testâ subdiscoideâ spiniferâ et squameo-liratâ, anfractibus olivaceo-viridibus, ultimo pallidè purpureo, laxè convolutis, umbilicum amplum formantibus, subangulatis, angulo spinis gracillimis, squamæformibus, nigris, supernè inflexis, coronato; anfractuum parte alterâ spinis brevioribus, contrariè inflexis, in seriebus dispositis, interstitiis squamis nigris, minutis sigillatim impositis, ornatis; spirâ depresso-concavâ.*

Delphinula melanacantha, Reeve, Conch. Syst., vol. ii. pl. 211. f. 4. and pl. 212. f. 10.

Long. $2\frac{1}{4}$; lat. $1\frac{3}{4}$ in. Mus. Cuming.

Hab. Ad insulam Mindanao, Philippinarum.

A magnificent specimen of this remarkable shell was dredged up by Mr. Cuming in —— fathoms' water at ——, one of the Philippine Islands, and we need only refer to our figures of it in the 'Conchologia Systematica,' in addition to the above description, to show how distinct is this species from any other of the genus. The shell is of a palish-green colour towards the apex, but the last whorl is purple and elegantly surmounted with a row of tall, black, slender, scale-like spines, bending over towards the point of the spire. Below these are five other distinct rows of black spines; they are,

however, shorter, and bend the contrary way, whilst the entire surface of the shell is ornamented with a number of very fine ridges of minute scales. We gladly avail ourselves of the opportunity of restoring to this shell the name by which it is commonly known amongst collectors, though not hitherto published.

DELPHINULA INCISA. *Delph. testâ globoso-discoideâ, liris purpureis angustis, subflexuosis, interstitiis albis profundè incisis, totaliter tectâ; anfractibus tuberculis grandibus, complicatis, distantibus, in seriebus duabus dispositis, ornatis; aperturâ rotundâ, margine inferiori lacunatâ; spirâ depresso-planâ.*

Icon. Reeve, Conch. Syst., vol. ii. pl. 212. f. 11.

Long. $1\frac{9}{10}$; lat. $1\frac{1}{2}$ in. Mus. Cuming.

Hab. Ad insulam Burias, Philippinarum.

This shell, which we believe to be at present unique, in the collection of Hugh Cuming, Esq., is well-characterized, by having a double row of large, pinched, stunted tubercles; and the tubercles, as well as the entire surface of the shell, is covered with a number of purple flexuous ridges, the interstices being white and unusually deeply cut.

DELPHINULA FORMOSA. *Delph. testâ rotundâ subdiscoideâ, levitèr nodiferâ, aureo-ochraceâ, cocceo-tinctâ, anfractibus perangulatis, angulo squamis grandibus, triangularibus valdè compressis, coronato; anfractuum parte inferiori squamarum minorum seriebus duabus, squamulisque ochraceo-coccineis minutis in seriebus parallelis, subflexuosis, dispositis, ornatâ; umbilico amplo purpureo-lacco vividè colorato; spirâ plano-convexâ.*

Icon. Reeve, Conch. Syst., vol. ii. pl. 212. f. 9.

Long. $1\frac{3}{10}$; lat. 1 in. Mus. Cuming.

Hab. Ad insulam Capul Philippinarum.

A very richly-coloured shell, found by Hugh Cuming, Esq., at Capul, one of the Philippine Islands, in seven fathoms' water. The upper portions of the whorls are clothed with a rich golden yellow colour, deeply tinged with scarlet or crimson; the lower part of the whorls are of a peculiarly soft white, and the umbilicus in all the specimens we have seen is coloured with a deep purple lake, entirely free from any indication of the yellow that ornaments the obverse portion of the shell.

DELPHINULA ACULEATA. *Delph. testâ subdiscoideâ, aculeatâ, albidâ, anfractibus perangulatis, angulo spinis squamæformibus flexuosis, dorsim coccineis, coronato, anfractuum parte inferiori spinarum seriebus duabus, aculeolisque squamæformibus in seriebus parallelis dispositis, ornatâ; spirâ depresso-planâ.*

Icon. Reeve, Conch. Syst., vol. ii. pl. 212. f. 8.

Long. $1\frac{1}{10}$; lat. $\frac{9}{10}$ in. Mus. Cuming.

Hab. Ad insulam Ticao Philippinarum.

This shell is not much unlike that of the preceding species; it differs, however, in having the angle of the outer whorl crowned with a row of irregular, thin, flexuous, scale-like spines, the back of each being ornamented with scarlet, the only portion of colour in the

shell; the surface is remarkable in being covered with a number of sharp prickles, particularly within and around the umbilicus.

Mr. Reeve also described a new species of the genus *Murex*.

Murex Stainforthii. *Mur. testâ subsolidâ, globoso-ovatâ vix fusiformi, multivaricosâ, superficie pallido-aurantiâ, epidermide tenui indutâ, transversim liratâ, liris fusco-lineatis; spirâ breviusculâ, apice subobtuso; anfractibus quinque, suturis indistinctis; anfractu ultimo varicibus octo ornato, cæteris, varicibus decorticatis, ferè obsoletis; varicibus per totam longitudinem densissimè frondosis, frondibus acutissimis, recurvis; canali brevi, latiusculo; aperturâ rotundâ, fauce crenulatâ, politâ, utrinque vividè aurantiâ.*

Long. $2\frac{1}{10}$; lat. $1\frac{1}{2}$ in. Mus. Inwood.

Hab. ——?

The very beautiful and characteristic shell above described has been handed to us by its fortunate possessor, Henry Inwood, Esq., accompanied with a request that it be named in honour of one of our most assiduous collectors, the Rev. Mr. Stainforth. And it is with no little pleasure that we have executed the task; for a shell more chaste in its colour and development, or more striking in its specific character, we do not remember to have seen. It is of a solid and somewhat globose structure, and is profusely ornamented with varices; there are eight distinct varices on the last whorl, and the remains of a similar number are visible on each of the former; but in the specimen before us, and which we believe to be unique, they are so decorticated as to have become almost obsolete. Each varix appears to have been formed by the sudden development of a number of coatings laid successively one upon the other. The edge of each of these coatings is then ornamented with a row of fine prickly branches, recurved back over the shell, and they only remain perfect to the last coating in consequence of those of the previous or under coatings having been necessarily in part removed or absorbed; unless indeed the under coatings are too rapidly developed, the one over the other, to allow of their marginal branches attaining the regularity and beauty of the last. The varix altogether has thus the appearance of being thickly studded from top to bottom with these delicate prickles: so delicately indeed are they formed, that it is only on the last or marginal varix of the shell that they remain in perfect order; in tracing them back round the body whorl, they may be observed to have become gradually more and more eroded. Should a specimen of this shell be found with all the varices in the same beautiful order as the marginal varix in this, it would indeed be "fair to look upon." The canal is rather short; the outer lip is strongly crenulated, and the crenulæ extend within the mouth of the shell, the whole of them, together with the broad columella, being covered with a highly polished orange enamel.

A letter from George Robert Gray, Esq., addressed to the Curator, was next read. This letter refers to the members of J. E. Gray's genus *Tetraogallus*, or Mountain Partridge, a rare species of which is at

present in the Society's menagerie, having been brought from Northern Persia, and presented to the Society by E. W. Bonham, Esq., H.B.M. Consul at Tabrez. Mr. G. R. Gray is of opinion that there exist three species of the genus *Tetraogallus*, each peculiar to one of the three following localities, viz. Caucasus, the Himalayan and the Altai Mountains.

The bird in the Society's menagerie, Mr. G. R. Gray observes, is well figured in plate 76 of Jardine and Selby's 'Illustrations,' and the specimen figured is, like that belonging to the Zoological Society, from Persia. It is peculiar in having the head, neck and breast of a slate colour, passing into pale reddish brown on the upper part of the back; a dingy white streak extends from the nostril to the anterior angle of the eye; the chin and throat, as well as an oblong patch on the side of the neck, are white; the breast is of a dark slate colour, and has short wavy black lines, especially just below the white of the throat. The figure referred to represents the typical *Lophophorus Nigelli*, which is most probably identical with the *Tetrao Caucasica* of Pallas; and if this supposition be correct, the earlier specific name given by the author just mentioned should be retained, as *Tetraogallus Caucasicus*.

Mr. G. R. Gray also believes the *Chourtka alpina* of Victor to be the same species as the bird under consideration.

In plate 141 of Messrs. Jardine and Selby's 'Illustrations,' a *Tetraogallus* is represented, which the authors suppose to be the male of the bird figured in plate 76; this is also delineated under the name of *Tetraogallus Nigelli* by Mr. J. E. Gray in the 'Indian Zoology.' This bird Mr. G. R. Gray, however, considers a distinct species, which is peculiar to the Himalaya Mountains, whence he has seen many specimens, all agreeing in colour. For this species the name *Tetraogallus Himalayensis* is proposed. It is distinguishable by its silky white neck and breast; a deep chestnut-brown line runs down, and partly surrounds the base of the neck, and the breast is variegated in front with black, each plume having a transverse band on the middle, which partly appears below the white tips of the other feathers.

The third species, *Perdix altaica* of M. Gebler, the distinctness of which there can be no doubt of, has the breast-feathers grey-black at the base; and this colour extends along the shafts, and forms an arched spot on each side of each feather: the under tail-coverts are white. It should be named *Tetraogallus altaicus*.

August 9.—Richard Owen, Esq., Vice-President, in the Chair.

The following paper, "On the Blood-Corpuscles of the Ibex," by George Gulliver, Esq., F.R.S., was read.

Before my discovery of the singularly minute size of the blood-corpuscles of the Musk Deer*, those of the Goat were the smallest known. I have since found that the corpuscles of the Ibex are slightly smaller than those of the Goat, and therefore intermediate in size to the corpuscles of the Goat and those of the Musk Deer,

* See Annals of Nat. History, Dec. 1839.

as will be shown by the following measurements, which are given in vulgar fractions of an English inch; the average size of those of the Ibex from Candia (*Capra Caucasica*, Guld.), = 1-7020 inch, and of the pale globules of the blood, = 1-3200 inch; of the Common Goat (*Capra Hircus*, Linn.), = 1-6366 inch, and of the pale globules of the blood, = 1-3032 inch; and of the Napu Musk Deer (*Moschus Javanicus*, Pallas), = 1-12325 inch, and of the pale globules of the blood, = 1-3200 inch.

I may add that Mr. Siddall, who has lately at my request measured the blood-corpuscles of the Ibex and of the Goat, has obtained almost exactly the same results as those above specified.

Mr. Gulliver also communicated a paper "On the Blood-Corpuscles of the British Ophidian Reptiles." To this communication are added some observations on the figure of the blood-corpuscles of other oviparous Vertebrata.

"The observations were made on perfectly fresh blood, and the corpuscles measured as they floated in the serum.

"Though the blood-discs of Birds and Reptiles preserve their shape very clearly when rapidly dried on a slip of glass, they generally appear in this state slightly but distinctly smaller than when suspended in the serum of recent blood; whereas, when the blood-discs of Mammalia are dried in precisely the same way they are commonly slightly larger than in the wet state, as I have noticed more particularly in the 'Philosophical Magazine' for January and February 1840, pp. 25 and 105."

"In Mammalia the envelope of the corpuscle is more delicate, more susceptible of contraction and of modifications of form, and apparently softer, than in Birds and Reptiles; so that the corpuscles of Mammals are more liable to shrink a little soon after removal from the circulating channels, than the corpuscles of Birds and Reptiles; and it may be that this softness of the blood-disc of Mammals allows it to spread out in some degree, even when dried ever so quickly. But it is more probable that the corpuscles preserve their usual size and form when dried almost instantaneously, and that the shrinking or modifications of shape which the corpuscles may undergo in liquid, coagulating, or slowly-dried blood, may be influenced as much by changes in the surrounding fibrine as by a contractility inherent in the corpuscles. The envelope of the blood-disc of Fishes is much more delicate and evanescent than the same part in Birds and Reptiles; hence in the blood of Fishes, even soon after death, the nuclei will be observed in great abundance, while the envelopes have partially or entirely disappeared; and the form of the entire corpuscles is not so easily preserved by drying as in the other oviparous vertebrate animals."

The following average dimensions of the blood-corpuscles of the Slow Worm, Snake, and Viper, deduced from measurements of the small, large, and common-sized discs, are all expressed in vulgar fractions of an English inch. L.D. stands for Long Diameter, and S.D. for Short Diameter.

March 19, 1842.—Slow Worm (*Anguis fragilis*, Linn.): L.D. =

1-1178 inch, S.D. = 1-2666 inch; and of the pale globules of the blood (abundant) = 1-2626 inch.

Sept. 9, 1841.—Common Snake (*Natrix torquata*, Ray): L.D. = 1-1371 inch; S.D. = 1-2157 inch; thickness = 1-8341 inch; nuclei, exposed by dilute acetic acid, L.D. = 1-3835 inch; S.D. = 1-6817 inch; and of the pale globules of the blood (tolerably numerous) = 1-2322 inch.

"The pale globules were generally granular and opake, though some of them were thin and transparent at the edges, as if growing into discs. In the blood there were many circular discs of a deep red colour, and generally 1-2666th of an inch in diameter. The regular discs were rounded at the edges, and almost all flat; but a very careful search might occasionally detect one or two with slight gibbosity of the surfaces opposite to the nucleus.

March 24, 1842.—Viper (*Coluber Berus*, Linn.): L.D. = 1-1274 inch; S.D. = 1-1800 inch; and nuclei, exposed by acetic acid, L.D. = 1-3227 inch; S.D. = 1-4986 inch.

"The discs were clearly gibbous on the surfaces opposite to the nucleus. The pale globules were very numerous, and their common diameter was 1-2666th of an inch.

"*Figure of the Corpuscles.*—From the preceding measurements it results, that although the blood-discs of the Viper and Snake present the form of an ellipse rather less than twice as long as it is broad, in the Slow Worm the elliptical figure of the discs is more elongated, since its length is considerably more than twice its breadth.

"As M. Mandl states, all observers had agreed that the long diameter of the oval blood-corpuscles of vertebrate animals was never more than one and a half or twice the short diameter, when he described the corpuscles of the *Crocodilidæ* as forming a singular exception to this rule; because he found that the long diameter of the blood-discs of *Crocodilus Lucius* was between two and three times as much as the short diameter. I am not aware whether M. Mandl had examined any other species of this family; but, as described in the 'Proceedings of the Zoological Society,' Nov. 10, 1840, I found that in *Crocodilus acutus* and in *Champsa fissipes* the corpuscles had the most common oval form, the length being rather less than twice the breadth*.

"In the 'Proceedings of the Zoological Society,' June 9, 1840, I showed that the blood-corpuscles of some birds differ greatly in figure from the corpuscles of other congenerous species. The corpuscles of the Snowy Owl (*Syrnia nyctea*), for example, are singularly elongated ellipses, while the corpuscles of the Common Brown Owl have the usual oval form; and a similar peculiarity, though in a less degree, was observed in comparing the corpuscles of the Passenger Pigeon (*Columba migratoria*) with those of other allied species.

* In an alligator, the species of which was not determined, I found the blood-corpuscles of the same shape. The animal came from Tampico Bay, Vera Cruz, and died at the gardens of the Society in the beginning of October 1842.

"Subsequently I have mentioned, in the 'Appendix to Gerber's Anatomy,' that the corpuscles of Birds may present, comparatively, either the figure of a very broad or of a very narrow ellipse. Of the latter shape, examples may be found in the corpuscles of the Great Butcher Bird (*Lanius excubitor*), Nightingale (*Philomela luscinia*), Snow Bunting (*Plectrophanes nivalis*); and of the former shape in the corpuscles of the Java Sparrow (*Loxia Javensis*), and several other granivorous birds.

"The nucleus of the blood-corpuscles of Birds, when exposed by acetic acid, has almost always a more elongated form than the unchanged envelope, as mentioned in the book just quoted. But to this rule I have since found a few remarkable exceptions. In the Common Fowl (*Gallus domesticus*), for instance, the nucleus is a very short ellipse, and even sometimes nearly or quite circular. For the difference between the shape of the nucleus, when exposed by acetic acid, or by soaking the corpuscles in water, a figure may be consulted which I have given to illustrate this subject in my 'Contributions to Minute Anatomy,' Lond. and Edin. Phil. Mag., August 1842, page 109."

A paper was then read from Mr. Gould, in which he gives the characters of two new genera of Birds, one belonging to the family *Sylviadæ* and the other to the *Psittacidæ*.

"Having observed," says Mr. Gould, "during my late visit to Australia, much difference to exist in the habits of the birds usually placed in the genus *Platycercus*, I was naturally led to investigate the matter as fully as circumstances would admit, and on examination of the two birds known as *Pl. erythropterus* and *Pl. scapulatus*, I found that the difference of their habits from those of the typical *Platycerci* was accompanied by a sufficient difference in their anatomy to warrant their separation into a distinct genus. Independently of the variations indicated in the generic characters given below, these birds are remarkable for possessing a tolerably well-developed *os furcatorium*, which bone is entirely wanting in the true *Platycerci* and *Euphemi*: in their habits they approach nearer to the Lories, are of a dull and sullen disposition, and do not readily become tame and familiar like the *Platycerci*; they are also essentially arboreal, procuring their food among the branches of the trees; while the *Platycerci* resort to the ground and feed principally upon grass seeds."

These two birds he therefore proposed to erect into a new genus, under the appellation of

APROSMICTUS.

Gen. Char. ut in Platycerco.—Rostrum attamen debilius, ceromate plumis tenuibus instar pilorum nares adumbrantibus instructo. *Alæ* longiores et minùs concavæ. *Cauda* magis quadrata. *Tarsi* breviores. *Digiti* longiores.

Types.—Platycercus scapulatus and *erythropterus*, which will now stand as *Aprosmictus scapulatus* and *A. erythropterus*.

The other birds which Mr. Gould proposed to form into a new

genus are the *Petroica rhodinogaster* of Messrs. Jardine and Selby, and the *Petroica rosea* of himself. These birds are much more arboreal in their habits than the true Petroicas, which are expressly adapted for the ground, while these are equally so to the thick brushwood, to the deepest gullies among which they usually resort. For this group he proposed the designation of

ERYTHRODRYAS.

Gen. Char. ferè ut in Petroicâ.—Rostrum attamen brevius, ad basim magis depressum, et vibrissis tenuibus anticè ductis naresque adumbrantibus instructum. *Alæ* breviores, magis rotundatæ; primariis primo et secundo brevissimis, quinto longissimo. *Tarsi* breviores. *Digiti* longiores; externi inter se ferè æquales. *Ungues* acutiores et magis incurvati.

Type.—Erythrodryas rhodinogaster (*Petroica rhodinogaster*, Jard. and Selb.).

To this genus also belongs the species characterized by him in the Proceedings of the Zoological Society for 1839, p. 142, under the name of *Petroica rosea*, which will now stand as *Erythrodryas rosea*.

August 23.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Prince exhibited, on the part of Mr. Gould, two new species of Australian Birds. These Mr. Gould characterizes as follows:—

ASTUR CRUENTUS. *Ast. capite et occipite plumbeis; torque nuchali castaneo dorso, alis, caudâque eplumbeo-fuscis; fusco colore apud dorsum magis prævalente, plumbeo apud ceteras partes; remigum primorum pogoniis internis ad basim albescentibus et plumbeo-fasciatis; corpore inferiore ferrugineo, fasciis crebris, angustis et semicircularibus ornato.*

Male.—Crown of the head and occiput dark slate-colour; sides of the face grey; at the back of the neck a collar of chestnut-red; back, wings and tail slaty brown, the brown hue predominating on the back and the slate-colour upon the other parts; inner webs of the primaries fading into white at the base, and crossed by bars of slate-colour; the interspaces freckled with buff; inner webs of the tail-feathers marked in a precisely similar manner; chin buffy white; all the under surface rust-red, crossed by numerous narrow semicircular bands of white; irides bright yellow; cere dull yellow; bill black at the tip, blue at the base; legs and feet pale yellow; claws black.

Total length, 14½ inches; bill, ⅞; wing, 7; tail, 6; tarsi, 2½.

Hab. Western Australia.

This species is intermediate in size between *Astur approximans* and *Accipiter torquatus*, but is of a more grey or blue colour on the back, and has the transverse lines on the breast narrower and more rufous.

LOBIVANELLUS PERSONATUS. *Lob. vertice et occipite nigerrimis; faciei lateribus nuchâ, uropygio, et corpore inferiore albis; dorso et plumis scapularibus pallidè fuscescenti-cinereis; paleis penden-*

tibus flavis; rostro ad basim flavis ad apicem nigris; pedibus e carneo-rubris.

Crown of the head and occiput jet-black; sides of the face, back of the neck, rump, and all the under surface pure white; back and scapularies light brownish grey; wing-coverts grey; primaries deep black; secondaries white at the base on their inner webs, cinnamon-grey on their outer webs, and largely tipped with black; the extreme ends of the feathers being cinnamon-grey, particularly the two central ones; irides primrose-yellow; wattles lemon-yellow; bill lemon-yellow at the base, black at the tip; legs and feet carmine-red; the scales in front blackish green.

Total length, 12 inches; bill, $1\frac{3}{4}$; wing, $8\frac{3}{4}$; tail, 4; tarsi, $2\frac{3}{4}$.

Hab. North coast of Australia.

This species is of the same size, but more elegantly formed than the *Lob. lobatus*, the fleshy wattles more extensively developed, the crown of the head only black, and not the back and sides of the neck, as in that species.

Mr. Waterhouse exhibited several species of Mammals, collected in Borneo by the Society's Corresponding Member, James Brooke, Esq., and recently forwarded to England by that gentleman.

Among these specimens was a fine example of the *Paradoxurus Derbianus*, Gray, an animal which has also received the names *Paradoxurus Zebra*, *Hemigalea Zebra*, and *Viverra Boiei*.

Two specimens of *Gymnura*, a specimen of the *Prionodon gracilis*, and two species of Squirrel, also formed part of the collection.

The *Gymnuri* differ much in colouring from the *G. Rafflesii*. Instead of having the fur black, and with longer interspersed white hairs, the Bornean specimens are entirely of a yellowish white colour, with the exception of the long bristly hairs interspersed with the ordinary fur, which are some of them black. In other respects the Sumatran and Bornean specimens of *Gymnura* agree so closely that Mr. Waterhouse did not regard the difference in colouring as indicative of specific distinction.

The existence of the *Prionodon gracilis* in Borneo is noticed by Müller, who applies to the animal the name *Linsang gracilis*. Believing the skull of this animal had never been described or figured, Mr. Waterhouse called attention to the peculiarities in its structure.

In some of its external characters, especially in the structure of its feet, with their truly retractile claws, the *Prionodon* evinces an affinity to the Cats, which would lead the naturalist to seek for some corresponding points of resemblance in the skull; this, however, presents all the characteristics of the *Viverridæ*: it is of the same elongated form; the lower jaw is long and slender, and the rami are curved, so that the angular portion and symphysis are raised. Compared with other *Viverridæ*, the Prionodon skull is remarkable for the thinness of the bones and the very slight development of the muscular ridges. In general form it approximates more nearly to *Paradoxurus* than to *Viverra* or *Genetta*. The zygomatic arch, which is slender, is thrown more boldly outwards than in the last two mentioned genera, and the posterior portion of the cranium does not

exhibit the sudden contraction immediately behind the posterior root of the zygomatic arch which we observe in the Viverras and Genets. The post-orbital process of the temporal bone is but little prominent, being in the form of an obtuse angle; the skull differing in this respect from that of *Paradoxurus*, as well as in having the palate continued considerably beyond the line of the posterior molars. The muzzle is much compressed. The temporal ridges are rather widely separated and but slightly marked, though, judging from the dentition, the animal was adult. The ant-orbital opening is larger than in *Genetta* and less advanced, and hence the branch of the superior maxillary which forms its upper boundary is narrower, as in *Paradoxurus*. In the form of the lower jaw there is a close approximation to *Paradoxurus*; the only important difference consists in the smaller antero-posterior extent of the coronoid process.

The teeth in Prionodon differ much from those of *Paradoxurus*; indeed, were the dentition alone to be considered, these two genera would be placed at opposite extremes of the Viverrine group, the last-mentioned genus evincing the nearest approach to an omnivorous diet, whilst the Prionodon possesses teeth the most unfitted for mastication.

The incisors are arranged closely together, and in a straight line; the incisor on each side of both jaws, nearest the canines, is rather larger than the others, which are slightly notched at the extremity. The canines are rather long, very slender, and moderately curved. The false molars, which are $\frac{3.3}{4.4}$, are much compressed, high, and sharply pointed. The foremost false molar, both of upper and lower jaws, is small, and has a small tubercle on the hinder part of the principal cusp. The second and third false molars of the upper jaw have each two small notches, and a corresponding number of small tubercles on the posterior margin and at the base of the principal cusp; and there is an indistinct tubercle in front, near the base: the second, third, and fourth false molars of the lower jaw have also the double notch behind, but differ in having a distinct, though small, anterior cusp. The first and second false molars of both jaws are separated from the other teeth and from each other by interspaces, of which the broadest is that which separates the second and third of these teeth in the upper jaw, the space here being nearly a line in width. The carnassier of the upper jaw very nearly resembles that of the Cat, but the central cusp is higher, and the inner tubercle is proportionally smaller. The carnassier of the lower jaw may be best described by comparing it with the corresponding tooth in the Genet, from which it differs only in having the cutting edges rather more produced, in being more compressed; the inner tubercle is more pointed, and the heel proportionately smaller. As regards the true molars, the present animal differs from other *Viverridæ* in possessing but one of these teeth on each side of the upper jaw; its true molars are therefore $\frac{1-1}{1-1}$, and this certainly does not arise from immaturity in the animal. The form of this tooth closely resembles

that of the foremost of the two upper true molars in *Genetta*, but is proportionately rather smaller and the tubercles are somewhat more developed. The true molar of the lower jaw is a mere rudimentary tooth, and differs from that of *Genetta* and other *Viverridæ*, not only in its small size, but in being of a compressed form: its cutting edge is divided by notches into three parts.

In the possession of but one true molar in the upper jaw, Prionodon would appear to approach the *Felidæ*; but the structure of this tooth, it must be observed, is essentially the same as in the *Viverridæ*, and it is combined with a small true molar in the lower jaw, which is never found in the Cats.

On the whole, Prionodon approaches most nearly to the Genets as regards its dentition; but in the general structure of the skull, Mr. Waterhouse observed, it evinced an affinity with the *Paradoxuri*, to which group it appeared to be linked by the *Paradoxurus Derbianus*, or *Hemigalea Zebra*. Links are nevertheless wanting to prove that Prionodon should be regarded as an offset from the Paradoxurine group.

One of the two Squirrels alluded to is the *Sciurus ephippium*, described in Dr. Müller's great work on the Zoology of the Dutch Possessions in the Indian Archipelago. The other closely resembles the *Sc. Prevostii* or *Rafflesii*, and may be a variety of that species; it differs in being smaller; the cheeks are freely pencilled with rusty red, instead of being grey as in *Rafflesii*, and the sides of the muzzle are of the same reddish hue, not having the white patch which is observable in Sir S. Raffles's Sumatran specimen; the outer side of the thighs has a grey tint, produced by the admixture of black and white; the hairs being of the former colour, but white or yellowish white at the point. In the type of *Rafflesii* the same part is furnished with uniform white hairs, excepting the hinder part of the thigh, which is black. The tail is uniform black in that animal, but the Bornean specimen has the hairs tipped with white in such a way as to produce rings; these rings, however, do not extend to the apical portion of the tail, about two inches of which is uniform black. The hairs covering the ears are partly black, but chiefly of the same rich rusty red as are all the under parts of the animal. The Sumatran animal has black ears. Dr. Müller, in the work before quoted, describes specimens of a squirrel from Borneo, which he regards as a variety of *Sc. Rafflesii*, and which agree closely with the specimen from Mr. Brooke's collection; this, however, has the hairs on the upper parts of the body of an uniform glossy black colour; Dr. Müller observes they are generally terminated with yellowish points in the specimens he met with.

Sept 13.—William Yarrell, Esq., Vice-President, in the Chair.

The first paper read was from J. O. Westwood, Esq. It contains descriptions of some Coleopterous Insects from tropical Africa, belonging to the section *Heteromera*, and is the continuation of a paper on the same subject, communicated to the Society August 24th, 1841, an abstract of which will be found in the 'Proceedings' of that date.

Genus Calostegia.

Corpus magnum oblongum. *Caput* mediocre, clypeo margine antico recto, angulis anticis valdè porrectis basin labri recipientibus. *Antennæ* crassæ breves, articulis 7–10 præcedentibus majoribus, ultimo majori apice subacuto. *Mandibulæ* ad apicem bidentatæ denteque altero majori in vel versus medium marginis interni armatæ. *Maxillæ* lobo interno in dentem corneum obtusum hamatum terminato. *Palpi maxillares* articulo ultimo securiformi. *Mentum* latum lateribus rotundatis, basi valdè constrictum. *Labium* quadratum. *Palpi labiales* articulo ultimo ovali. *Prothorax* subquadratus anticè paullò latior, lateribus versus angulos anticos serratis. *Elytra* oblongo-ovalia lævia metalli-colorata. *Pedes* crassi, femoribus omnibus ante apicem bispinosis; tibiis intus, ante et pone medium sinuatis.

Calostegia purpuripennis. *Cal. nigra subopaca lævis, elytris purpureis sub lente tenuissime striato-punctatis.*

Long. corp. lin. 17; lat. elytror. ferè lin. 6.

Hab. in Ashantee. Mus. D. Hope.

Nyctobates mœrens. *Nyct. niger subnitidus, capite thoraceque sub lente tenuissime punctatis, elytrisque tenuissime striato-punctatis, pedibus longis, tibiis subincurvis, thoracis angulis posticis acutis.*

Long. corp. lin. $8\frac{1}{2}$; lat. elytr. pone medium lin. $3\frac{3}{4}$.

Hab. in Guineâ. In mus. nost. communic. D. Raddon.

Totus niger parùm nitidus. *Caput* margine antico (clypeo incluso) subsemicirculari, clypei utrinque incisione parvâ in lineâ obliquâ impressâ desinente distinguendo; lineâque alterâ impressâ longitudinali utrinque ad marginem internum oculorum. *Superficies* capitis regulariter punctata punctis parvis. *Antennæ* articulo primo crasso longitudine 4^{ti}, 2do minuto, 3^{tio} longo, cæteris longitudine ferè æqualibus at sensim latioribus, 5 ultimis compressis setosis, ultimo ovali, basi truncato, apice rotundato. *Mandibulæ* subtrigonæ apice acutæ, intus edentatæ sed spatio mediano membranaceo. *Maxillæ* lobo interno in uncum corneum terminato. *Palpi maxillares* articulo ultimo securiformi. *Mentum* subquadratum anticè paullò latius, anticè carinâ curvatâ instructum: labium breve transversum ciliatum. *Palpi labiales* breves articulo ultimo dilatato-ovali apice truncato. *Prothorax* capite multo latior, margine antico truncato, lateribus rotundatis, angulis posticis acutis; marginatus, margine antico tamen in medio interrupto; superficies tota crebre punctata, punctis minutis et non approximatis. *Elytra* basi thorace latiora, humeris rotundatis; sensim latiora, apice utrinque parùm sinuata; dorso gibboso superficies sub lente quasi coriacea; singulo striis 9 e punctis minutis formatis oculo nudo vix conspicuis, striâ internâ propè scutellum abbreviatâ. *Pedes* longi, graciles, femoribus anticis crassioribus; omnibus apice inermibus; tibiis anticis pone medium parùm intus curvatis, apice externè intus setoso, extus obliquè truncato, tibiis 4 posticis subrectis, medio vix subincurvato, apiceque subinflexis; calcaribus omnibus minutissimis.

Nyctobates confusus. *Nyct. niger lævis subnitidus, elytris latioribus, pronoti lateribus in medio sinuatis et sanguineo-marginatis.*

Long. corp. lin. 1 ; lat. elytr. pone med. lin. 5.

Hab. in Africâ æquinoxiali. Mus. Soc. Linn. Lond. D. Banks.

Caput nigrum, sub lente tenuissime punctatum carinâ longitudinali utrinque versus marginem internum oculorum. *Antennæ* articulis apicalibus latioribus. *Pronotum* transversè quadratum, angulis anticis obliquè truncatis et parùm rotundatis, lateribus in medio sinuatis tenuissime marginatis, angulis posticis acutis ferè rectangulis ; sub lente tenuissime punctatum ; lateribus latè et obscurè sanguineis, colore sanguineo ante medium intus acutè producto, dorso nigro ; margine postico in medio versus scutellum parùm producto. *Elytra* nigra nitida lævia, latiora quàm in congenericis, præsertim pone medium, apicem versus attenuata ; sub lente seriebus 8 longitudinalibus punctorum minutorum. *Pedes* longitudine mediocres, graciles, tibiis simplicibus ferè rectis.

Individuum in mus. D. Hope vidi lineas $9\frac{1}{2}$ tantum habens, staturâque parùm minus robustâ ; vix tamen species distincta.

Nyctobates punctatus. *Nyct. niger obscurus, prothoracis angulis anticis rotundatis, lateribus in medio incisis angulisque posticis acutis, elytris punctato-striatis, antennis sensim dilatatis.*

Long. corp. lin. $9\frac{3}{4}$; lat. elytr. pone med. lin. ferè 4.

Hab. in Guineâ. In mus. D. Hope, comm. D. Westermann.

Syn. Helops punctatus, *Fabr.*, Syst. Eleuth. i. 161.

Caput obscurum sub lente tenue punctatum ; clypeo posticè impressione transversâ e vertice separato, carinâque utrinque ad marginem oculorum. *Antennæ* mediocres sensim ad apicem incrassatæ compressæ, linea tenui mediâ impressâ posticâ. *Prothorax* subquadratus angulis anticis rotundatis, lateribus in medio sinuatis, tenue marginatis, angulis posticis acutis et parùm extus productis ; margine postico versus scutellum posticè producto. *Elytra* thorace haud multo latiora pone medium parùm latiora, singulo seriebus 8 longitudinalibus punctorum impressorum magnitudine irregularium, striâque alterâ abbreviatâ versus scutellum ; striis 1 et 2 ad basin connexis ; striæ 5 et 6 longe ante apicem conjunguntur ; striæ 3 et 4 propiores, 2 et 7, et 1 cum 8vâ connexis. *Pedes* longitudine mediocres, tibiis simplicibus et ferè rectis. *Mesosternum* anticè bidentatum, prosterni apicem acutum recipiens.

I give the insect here described as the true *H. punctatus*, Fab., on the authority of a specimen received by the Rev. F. W. Hope from Copenhagen, from M. Westermann, who has such excellent opportunities of determining those Fabrician species which were described from the cabinets of Lund and Sehestedt, as was the case with the present species. This is the more important, as the Fabrician description is so slight as to be applicable to scores of species of Heteromerous insects.

Nyctobates Hypocrita. *Nyct. niger subobscurus tenuissime punctatus, prothoracis lateribus subrotundatis integris angulis anticis acutis, antennis longioribus apice parùm latioribus.*

Long. corp. lin. $8\frac{3}{4}$; lat. elytr. pone med. lin. $3\frac{1}{2}$.

Hab. in Guineâ. In Mus. D. Hope, comm. D. Westermann.

Syn. Iphthinus Hypocrita, *Dej.*, Cat. sine descr.; Iphthinus Guineensis, *Westermann*, MSS.

Niger subobscurus. *Caput* (præsertim in clypeo) et prothorax punctata; clypeus e vertice lineâ impressâ curvatâ vix separatâ, carinâ utrinque parùm elevatâ ad marginem internum oculorum. *Antennæ* graciles articulis 3 vel 4 ultimis parùm latioribus compressis. *Prothorax* subquadratus, lateribus subrotundatis marginatis integris angulis posticis acutis; margine postico ferè recto tenuè marginato. *Elytra* parùm convexiora quàm in reliquis; singulo sulcis 8 profundis longitudinalibus et punctatis, inter se connexis ut in specie præcedenti; pone medium paullò latiora et posticè acuminata. *Pedes* longiores, simplices, tibiis parùm curvatis.

Nyctobates transversalis. *Nyct. niger subobscurus subpunctatus, capite parvo, oculis magnis, antennis apice haud incrassatis, prothorace transverso angulis anticis rotundatis, lateribus integris, elytris striato-punctatis.*

Long. corp. lin. $9\frac{1}{2}$; lat. elytr. lin. 4.

Hab. apud Sierram Leonam. In mus. D. Hope et Waterhouse.

Caput sub lente punctatum, præsertim in clypeo magno transverso-ovato, e vertice lineâ forti impressâ semicirculari diviso; oculi magni, angulis internis intus productis, spatio parvo intermedio tantum relicto; carinæ duæ interoculares subobsoletæ. *Antennæ* breves subdepressæ, articulis 7 ultimis subæqualibus apicem versus haud incrassatis. *Prothorax* latior quàm longus lateribus tenuè marginatis subrotundatis integris angulis posticis vix acutis; margine postico ferè recto; dorso tenuè punctato. *Elytra* ferè parallela, thorace latiora, angulis humeralibus obliquè truncatis longitudinaliter sulcatis, sulcis sub lente punctatis, striâque alterâ abbreviatâ versus scutellum. *Pedes* graciles simplices, tibiis ferè rectis.

Nyctobates brevicornis. *Nyct. niger, capite et pronoto tenuissime punctatis, antennis brevibus, prothorace quadrato lateribus parallelis, elytris punctato-striatis, pedibus brevibus.*

Long. corp. lin. 11; lat. elytr. lin. $4\frac{1}{4}$.

Hab. in mus. D. Hope.

Caput sub lente tenuissime punctatum, clypeo e vertice vix separato, carinisque interocularibus obsoletis, oculi margine interno rotundato. *Antennæ* vix capite longiores articulis 6 apicalibus compressis subæqualibus. *Prothorax* quadratus lateribus ferè rectis et parallelis angulis anticis rotundatis, posticis vero acutis margine postico in medio paullò rotundato-producto; disco tenuissime punctato lineâ tenuissimâ punctorum medianâ. *Elytra* subparallela elongata, prothorace parùm latiora, singulis seriebus 8 punctorum profundè impressorum, striâque basali interruptâ punctatâ versus scutellum. *Pedes* breves simplices, tibiis ferè rectis.

Nyctobates rotundicollis. *Nyct. niger subopacus, capite pone oculos utrinque sulcato, thorace rotundato varioloso-punctato, elytris profundè punctato-striatis.*

Long. corp. lin. 7; lat. elytr. lin. $2\frac{3}{4}$.

Hab. in Sierrâ Leonâ. In mus. D. Hope et Waterhouse.

Caput punctatum, clypeo magno e vertice impressione curvatâ separato. *Oculi* majores, carinis interocularibus obsoletis, sulco utrinque ex angulo interno oculorum ad prothoracem ducto. *Antennæ* breves, articulis 6 ultimis majoribus subæqualibus subtriangularibus latis depressis ultimo majori. *Prothorax* rotundatus lateribus rotundatis, angulis posticis subobtusis, disco varioloso punctatissimo; margine postico magis marginato quàm laterali, et in medio parùm versus scutellum rotundato. *Elytra* lateribus ferè parallelis, angulis humeralibus rotundatis, singulo striis 9 punctorum profundè impressorum, striis 4 et 5, 3 et 6, 7 et 8, 2 et 9, ad apicem conjunctis. *Pedes* breves simplices, tibiis rectis, femoribus anticis crassioribus.

Genus Nesioticus.

Corpus breve rotundatum valdè gibbosum. *Caput* mediocre, breve margine antico (clypei) et lateribus (ante oculos) elevatis, vertice parùm concavo. *Labrum* breve transversum, angulis anticis rotundatis, ciliatum. *Mandibulæ* trigonæ crassæ, extus rotundatæ, intus sinuatæ, cavitate parvâ in medio. *Maxillæ* lobo externo majori, subarticulato, valdè setoso, interno setoso inermi. *Palpi maxillares* crassi, articulo ultimo maximo securiformi. *Mentum* oblongum, anticè paullò latius angulis anticis acutè productis. *Labrum* subquadratum angulis anticis rotundatis, setosum. *Palpi maxillares* breves articulo ultimo ovato, apice subtruncato. *Antennæ* prothorace ferè longitudine æquales articulo basali detecto, 3^tio^ 4^to^ duplo longiori, hoc ad 10^um^ latitudine parùm crescentibus compressis, longitudine æqualibus, articulo 11^mo^ præcedenti parùm longiori subrotundato. *Prothorax* transversus, anticè angustior, lateribus subrotundatis, angulis posticis acutis. *Scutellum* triangulare. *Elytra* valdè convexa ovali-rotundata, thorace ferè duplo latiora. *Pedes* simplices longitudine ferè æquales, tibiis rectis, tarsis subtùs setosis, marginibus acutis. *Mesosternum* obtusum paullò porrectum. *Venter* 5-annulatus.

Nesioticus flavopictus. *Nes. niger nitidus lævis, elytrorum humeris apicibusque signaturis flavo-notatis.*

Long. corp. lin. 8; lat. elytr. lin. 4½.

Hab. Gold Coast, Africæ tropicæ. In mus. Westw. comm. D. Raddon.

Niger nitidus lævis sub lente haud punctatus capite excepto. *Labrum* piceum. *Antennæ* nigræ articulo ultimo apice brunneo. *Vertex* tenuissime punctatus. *Thorax* lateribus tenuissime marginatis. *Elytra* valdè convexa nitida, singulo lineis 8 punctorum minutorum impresso; fasciâ tenui transversâ flavâ versus basin ad suturam interruptâ, et cum strigâ marginali, alterâque mediâ longitudinali versus basin elytrorum extensâ connexâ; singulo elytro etiam versus apicem signaturâ tenui subtriangulari ejusdem coloris notato.

Genus Oncosoma.

Corpus breve latissimum. *Caput* mediocre carinâ utrinque e margine antico et interno oculorum ferè ad basin mandibularum ductâ. *Antennæ* longitudine capitis et prothoracis, graciles, vix versus apicem crassiores, articulo 3^tio^ longissimo, 4^to^ et reliquis sub-

æqualibus setosis. *Mandibulæ* crassæ, extus rotundatæ, apice subbifidæ, margine interno ferè recto. *Labrum* transversum emarginatum. *Mandibulæ* lobis duobus membranaceis ciliatis. *Palpi maxillares* articulo ultimo magno securiformi. *Mentum* obconicum basi truncatum et angustatum angulis anticis acutis, in medio longitudinaliter carinatum. *Labium* cordatum. *Palpi labiales* articulo ultimo majori ovali, apice acuminato. *Prothorax* latior quàm longus, convexus, lateribus in medio rotundato-angulatis, angulis anticis et posticis acutis. *Elytra* prothorace multo latiora, convexa, rotundata, interrupto-costata. *Pedes* mediocres graciles setigeri.

Oggosoma granulare. *Ogcos. nigrum sericeum prothorace punctis duobus rotundatis discoidalibus, elytris irregulariter et interrupto-costatis, antennis pedibusque cinereo-setosis.*

Long. corp. lin. 6; lat. elytr. lin. 4.

Hab. in Gambiâ. In mus. Westwood.

Caput et thorax nigra, sericea, (*sc.* sub lente) tuberculis minutissimis alterisque majoribus sparsis nitidis obsita; hoc lateribus sub medio angulato-rotundatis, marginatis. *Elytra* nigra et magis nitida, minutissime granulata, tuberculisque numerosis majoribus elongatis et irregularibus, costas duas in singulo elytro quodammodo formantibus; lateribus marginatis et deflexis latera abdominis cingentibus. *Pedes* sat breves graciles, tibiis posticis parùm curvatis.

Genus Megacantha.

Corpus robustum, crassum, convexum. *Caput* breve, punctatum, lateribus ante oculos elevato-tuberculatis. *Oculi* reniformes. *Labrum* transversum, angulis anticis rotundatis. *Mandibulæ* crassæ, apice parùm bidentatæ. *Maxillæ* lobo interno membranaceo, externo magno valdè setigero. *Palpi maxillares* articulo ultimo securiformi. *Mentum* crateriforme. *Labium* cordatum. *Palpi labiales* breves, articulo ultimo crasso ovali, apice subtruncato. *Antennæ* sat longæ, articulo 3^{tio} vix 4to longiori, 7mo cæteris parùm crassiori, hoc et reliquis præcedentibus paullò latioribus. *Prothorax* rotundatus anticè et posticè subtruncatus, capite multo latior. *Elytra* brevia oblongo-ovalia, thorace latiora, convexa, punctato-striata. *Pedes* satis elongati, femoribus anticis crassis ante apicem internè dente valido curvato armatis; tibiæ anticæ ante medium paullò extus curvatæ; intermediæ intus subserratæ; posticæ rectæ.

Fœmina differt capite et prothorace paullò minoribus, hoc minus rotundato, pedibus anticis brevioribus et gracilioribus, dente femorum anticorum multò minori, tibiisque anticis minus curvatis, tibiisque intermediis haud serrulatis.

Megacantha tenebrosa. *Meg. nigra subnitida punctata, elytris striato-punctatis, angulis humeralibus distinctis.*

Long. corp. lin. $9\frac{1}{2}$-$10\frac{1}{2}$; lat. elytr. lin. $4\frac{3}{4}$.

Hab. Ashantee. In mus. D. Hope.

Caput nigrum punctatum, clypeus brevis vix e vertice separatus. *Oculi* intus subapproximati, lunulâ tenui lævi subnitidâ et subelevatâ interjectâ, tuberculi anteoculares magni, basin antennarum tegentes. *Prothorax* tenuè punctatissimus lateribus rotundatis, angulis anticis

acutis, posticis subacutis. *Elytra* sat profundè 8 striato-punctata; striâque alterâ valdè abbreviatâ versus scutellum; striis 4 et 5, 3 et 6, et 2 et 7, posticè conjunctis. *Pedes* et corpus infra nigra subnitida. An *Helops dentatus*, Fab.?

Mr. Reeve then communicated to the Meeting "Descriptions of four new species of bivalve shells by Mr. Hanley."

Solen acuminatus. *Sol. testâ albidâ, epidermide tenui griseo-viridescente indutâ, elongatâ, latitudine longitudinem tripliciter superante; posticè rotundatâ; anticè acuminatâ extremitate rotundatâ; marginibus arcuatis, ventrali propè in medio incurvatâ; dentibus in utraque valvâ duobus, angustis, uno valdè minore.*

Long. $\frac{3}{4}$; lat. $2\frac{3}{5}$ poll.

Hab. in flumine Hoogley, Indiarum Orientalium.

This shell, which has been found in great abundance at the mouth of the river Hoogley, is somewhat allied to the *Solen acutidens* of Broderip; it is well distinguished by its anterior acumination.

Psammobia costata. *Psam. testâ subellipticâ, anticè angulatâ; posticè breviore angustatâ, extremitate rotundatâ; pallidâ, radiis angustis roseo-lividis ornatâ; transversim irregulariter costatâ, costis rudibus, planulatis, anticè subfurcatis; intus vel purpureâ, vel aureâ.*

Long. 1; lat. $1\frac{3}{4}$ poll.

Hab. ad oras Novæ Zealandiæ.

The coarse and somewhat prominent ribs render this shell easily distinguishable from the rest of the *Psammobiæ*.

Cytherea effossa. *Cyth. testâ ovali-subcordiformi, subæquilaterali, crassâ, nitidâ, convexâ, transversim profundè sulcatâ; sulcis subremotis, interstitiis planulatis; albido-lividâ, lineis angularibus, saturatioribus, venulatâ; ano impresso, lanceolato; vulvâ effossâ lateribus candidis, fasciis spadiceis undulatis, transversim pictâ; disco interno purpureo, marginibus crenatis.*

Long. $\frac{4}{5}$; lat. $1\frac{1}{3}$ poll. Mus. Stainforth.

Hab. ——?

The very singular manner in which this and the following species are excavated on the anterior side forms their prominent and distinguishing characteristic.

Cytherea excavata. *Cyth. testâ rotundato-ovatâ, subæquilaterali, posticè expansâ, anticè propter marginis ventralis obliquam curvationem angustatâ; crassâ, lævi, nitidâ, depresso-convexâ, pallidè fulvâ, venis lividis angularibus, plus minusve distinctis, marmoratâ; ano lanceolato; vulvâ valdè excavatâ, lateribus planulatis, candidis, spadiceo leviter venulatis; disco interno roseo; marginibus tenuiter crenulatis.*

Long. 1; lat. $1\frac{1}{3}$ poll. Mus. Stainforth.

Hab. ——?

This shell resembles the preceding by its anterior excavation, but differs both in shape and in the absence of the transverse grooves.